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ABSTRACT

For student learning to improve, teacher learning must also improve. Currently, teachers are not being prepared to foster student learning in reasoning, problem solving, or explaining. These are skills required by the national goals. Considerable research has been done on the learning needs of teachers; however, this research is not reaching practicing or prospective teachers. Teacher education institutions and the research community share responsibility for failing to transmit research findings to teachers and train them to use the findings. Several Office of Educational Research and Improvement (OERI) research centers have conducted studies which relate to teacher learning needs. A major OERI priority is dissemination of research. Other OERI activities which relate to improving teacher education include: "The Campaign to Support America's Teachers," a 3-year program to provide teachers with relevant and timely research-based information; "Partnerships for Innovative Teacher Education," which provides grants for partnerships between institutions of higher learning and local school districts to establish school-based professional development for prospective and practicing teachers; and the Federal Coordinating Council for Science, Engineering and Technology (FIX-IT), a federal interagency group which focuses on the enhancement and preparation of mathematics and science teachers. (IAH)

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Annual Meeting
American Association of Colleges of Teacher Education
February 27, 1991

It is nice to be here in Atlanta with you this afternoon.

Your organization has been very supportive of the Office of Educational Research and Improvement. I have greatly appreciated AACTE's efforts to help members of Congress understand the value of research and the need for its funding.

You should know that I actively sought this opportunity to speak here. I believe this group -- people who teach teachers their craft -- are vital to improving America's schools. And I believe this group is too often overlooked in the education reform debate.

These are exciting times in education. The national discussion over learning has been elevated to unprecedented levels. The arrival of President Bush's new Education Secretary will keep the issue on the front burner. Lamar Alexander was an education governor before it was fashionable. He asserted bold leadership not only as Governor of Tennessee, but as chairman of the National Governors' Association task force on education. He presided over the Governors' 1986 report, "Time for Results."

That title reflects the mood of America. People want results.

Achieving results was what the education summit in Charlottesville, Virginia, was about 18 months ago. That's what the national goals are about. They embody the nation's recognition that we must do far better than we've ever done. Anyone who has looked at them knows how ambitious they are, but how can we ask for less?

We must have all American children ready to learn when they start school. We can not accept a graduation rate of less than 90 percent. We can not accept less than requiring our students to demonstrate not just basic skills but competency over challenging material. Can we ask them to be less than first in the world in math and science? We must have an entirely literate population that continues learning as adults. And we must demand that our schools are free from drugs and violence.

The very good news since the goals were adopted is that the nation has indeed embraced them. Governors have taken them to heart. Many states, including here in Georgia, have accepted them and added to them, and that is the way it should be.

But as hard as the negotiations seemed to many of us involved at the time, setting the goals was easy. Now comes the hard part of achieving them. It will take all of us. Politicians and public

officials. Principals and teachers, students and their parents. The business community. And especially educators like you who train our teachers. All of us.

It will take a great deal of effort, sustained over many months and years. There is no magic bullet or quick fix.

But we should not be overwhelmed by the size of the task. Indeed this might be the time to remember the words of John Kennedy nearly 30 years ago when he talked about our national goal of reaching the moon. Kennedy said:

"We choose to go to the moon. We choose to go to the moon in this decade and do the other things not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone and one which we intend to win."

Today we too should be optimistic. Look around this room at the people who are now working on this issue. Look around the country at how education has moved to the top of the agenda in every state, and in almost every jurisdiction. There are solutions. Together we can produce results.

AND IT IS RESULTS THAT WE ARE AFTER. These goals did not come

out of a vacuum. Underlying the efforts of President Bush and the governors was a basic concern over the poor performance of America's students.

The goals are designed to create a new educational order that is based on performance. The President and the governors summed this up with a single phrase. They said: "All of our people, not just a few, must be able to think for a living." That means all our children must learn to think. They must learn not just to answer questions, but to ask them.

They must learn to think in each subject. They must learn to reason mathematically, solve problems scientifically, reason historically, and communicate clearly. So all of us must do a better job. And the change we are talking about is not marginal change but systemic restructuring of the system. Just as schools are rethinking their organization and curriculum, you must rethink how America's teachers learn.

We must make education -- for our children and ourselves -- central to our national agenda, to our states' priorities and to our local concerns. We must make teachers as important in society as lawyers or doctors. We must make principals as important as corporate executives. And we must make school board membership as important as service in a state legislature or on a corporate board.

For student learning to improve, teacher learning must also improve. This point was made abundantly clear in a national conference that we sponsored in December. We found that teachers are not being prepared to foster student learning in reasoning, problem-solving or explaining. But these are exactly the skills required by the national goals.

We will be publishing a short booklet based on this teacher education conference soon, as well the conference proceedings later this year. If you are interested, we have ordering forms at the conference registration desk.

OERI's goal is to help create this new world of education. Our mission is to help teachers, parents and others improve student learning. That is our bottom line, and I believe it is your's too. What I would like to focus on today is the improvement of teacher learning in service of that bottom line: what teachers must know and be able to do to help our children learn effectively.

I'd like to tell you about a number of projects we are working on to address the learning needs of teachers. I would also like to talk about basic changes that I believe are necessary in the world of teacher learning. Your world.

There are several areas in which OERI has been particularly

active in improving teacher learning.

The most prominent are our 25 national research centers. They are the core of knowledge development about teaching and learning. All of our centers do work of concern to teachers, but I want to mention several that are directly related to improving teacher learning.

Most of you are familiar with the Learning Research and Development Center at the University of Pittsburgh. Let me share some of the LRDC's findings that I believe are critically important for teachers to know.

LRDC's research has helped us understand that beginning learners are not blank slates. They possess preconceptions that can serve as building blocks for further learning, and they have misconceptions that must be overcome if learning is to proceed successfully. When teachers fail to take into account this background knowledge, the result may be very superficial learning. This is exactly the kind of research finding that classroom teachers -- and prospective teachers -- must learn.

Consider mathematics for example. We now know that children have much more mathematical understanding when they arrive in school than we once thought. Even babies understand elements of quantity well before they could have been taught informally. At six

months, infants can discriminate the number of items among small groups when these are visually presented. Preschoolers develop a good bit of quantity knowledge -- about big and small, lots and little -- such as one glass contains more milk than another.

Previous research focused on the limits of preschoolers' math knowledge. We now believe it is more useful to focus on what they do know so we can build upon it in instruction.

The implications for teaching from these findings are important. Our elementary schools stress computational drill. But according to this work by LRDC, classroom time might more effectively promote learning if it focused on understanding why mathematical procedures work and on problem-solving.

This work also highlights the need to know much more about measuring children's understanding. If teachers are going to change their students' misconceptions and build on prior knowledge, they need to know how to assess students' existing knowledge. This will require much more training than most teachers have received. Our states and schools clearly are moving toward performance-based assessments. Teacher learning must keep step with and contribute to these developments.

Other possibilities for improving teaching come from comparative research studies of different styles of mathematics

teaching in Japan and the United States. An elementary school lesson in Japan is likely to consider only two or three problems, discussing them from many angles and exploring underlying principles and implications. A comparable American lesson is likely to only briefly explain a procedure and then have children solve many similar problems. This emphasizes speed and accuracy rather than understanding. The different approach may have much to do with the higher mathematics performance of Japanese students.

Another major finding from LRDC is that learning is an active constructive process. If students are to understand the concepts presented in the classroom, they must actively work with these concepts. When new information is presented in the classroom, students should be encouraged to relate it to their own knowledge of the topic, to interpret it, question it and explore its uses.

But as we all know, today's schools typically encourage passive rather than active learning. Too much emphasis is placed on memorizing instead of understanding. The result is too many students finish school with inert information rather than usable knowledge.

Prospective teachers must be familiar with this view of active learning. They must understand its implications for their behavior in the classroom.

Consider also the work by LRDC on textbooks. Social studies texts, for example, do a poor job of helping children understand the content. Too much emphasis is placed on describing isolated facts and events. Too little emphasis is placed on helping children understand connections among events.

One research study of four different fourth-grade texts on the subject of the desert showed that useless comparisons and examples were given, that major points were not explicitly stated, that too many concepts were presented requiring sophisticated background knowledge. . . . and the list goes on.

One book, for example, said that when rain falls in a desert, little water soaks in so the running water can cut into the land and change it. But the nature of those changes, such as canyons and dry river beds, is not described.

This has obvious implications for what prospective teachers need to learn about using textbooks in instruction. They must know how to evaluate the effectiveness of textbooks in helping students to learn. They must know how to deal with these gaps in the texts. And they must know how to use a variety of tools beyond the textbook to enrich the learning process.

I emphasize LRDC's work because its research program is longstanding and these findings are well-grounded. But among our

other 24 research centers, there is much work underway that is also critical to teachers.

Our center at Michigan State University, for example, focuses specifically on problems of teacher learning. Over the last five years, this center has shown us that giving prospective teachers more subject knowledge is important but it does not necessarily yield a better understanding of how to teach the subject. Over the next five years, this center will be further pursuing the importance of learning to teach. These researchers at Michigan State view teaching quite differently than the traditional model of maintaining classroom order while students passively absorb knowledge. We expect this center will provide a better understanding of what teachers must know and do to foster the kind of student learning envision in our national goals.

While many of you are probably familiar with the work done at Michigan State, you may not know that we have a new center at Western Michigan University in Kalamazoo. The Center on Educational Accountability and Teacher Evaluation -- with the wonderful acronym CREATE -- has an ambitious mission of improving educational evalutation practices in all 50 states. Its first tasks will include identifying the best models of evaluation systems, testing them and disseminating these models.

But no matter how valuable our research is, it is useless if it does not reach those people who need it: teachers in the classroom and propsective teachers.

Let me be blunt. I am critical of teacher education schools for both failing to make future teachers aware of the latest research, and for failing to train them well to use the research base when they reach the classroom. But I am equally critical, perhaps more so, of the research community for failing to put key findings in clear language and get it into the hands of teachers in a timely fashion.

At OERI, we are working hard to change that. Dissemination has been one of my top priorities. Inside my agency, we are going to great lengths to listen to what teachers say about the research and practice information they need and to supply it in a way they find useable. We have held meetings and focus groups with teachers and parents to better understand those needs. We are working to innovatively package information in new formats that meet those needs.

We will be funding a new research center on dissemination and the use of knowledge. Let me emphasize my commitment to the issue here. When we first competed this center last year, the proposals were traditional and academic. That is not what we need. We chose to recompete this center instead.

And we have translated this dissemination commitment into formal requirements for our research centers and our 10 regional laboratories.

We will be spending more than $160 million over the next five years on the labs. Much of that money will go toward efforts to educate teachers. The Northwest Regional Lab, for example, will develop, implement and conduct research on two comprehensive professional development programs, one urban and one rural. It will hold two major conferences on professional development. Another lab, the Northcentral Regional Lab, has produced a wide variety of video and print materials supporting teacher learning. In partnership with Public Broadcasting Service, the lab has held a number of nation-wide video teleconeferences.

Beyond dissemination let me tell you quickly about three more OERI activities that demonstrate our support of teachers and their development:

1. We have just begun what we call "The Campaign to Support America's Teachers." This is a three-year program designed to help teachers by providing them with relevant and timely research-based information directly and through their professional organizations.

2. Our just-announced budget request for the fiscal year that

begins in October includes $20 million for what we call "Partnerships for Innovative Teacher Education." This seed money would provide grants for partnerships between institutions of higher education and local school districts to establish school-based professional development for prospective and practicing teachers. It would also be a base to conduct research on teaching and learning.

3. We have played a lead role coordinating for the first time a federal interagency budget for mathematics and science education. The number one priority of this group is teacher enhancement and preparation. The aim is to strengthen existing math and science teachers, attract new teachers, raise the status of teachers and teaching, and provide these teachers with hands-on experience in cutting-edge science and mathematics.

There was plenty of evidence for this interagency group -- which we call FIX-IT, the official name of which is the Federal Coordinating Council for Science, Engineering and Technology. Consider some data developed by my office through a massive new survey of American teachers:

We looked at what percentage of teachers were teaching in the field in which they had both majored and were certified. Overall, about three teachers out of four are teaching in their field. But in math and science the proportion is far lower. Only 7 percent of

elementary school math teachers and 14 percent of elementary science teachers have both majored and are certified in their subject. At the high-school level, the numbers are better but not good enough: 60 percent for math teachers and 67 percent for science teachers.

We would not hire someone trained as a civil engineer to design electronic components, or ask an opthamologist to look at a foot injury. Why then do we expect teachers without special training to handle the most difficult subjects, to do it well and even to inspire their students to go on in that field? We obviously need to upgrade the development of math and science teachers. We also need to use more team teaching at the elementary level so not every teacher has to deal with subjects for which they are not trained. And we have to make sure that new teachers are adequately prepared.

At the federal level, we can provide leadership and some direction. But if real systemic restructuring is to occur, it is people like you who must drive that change. You are the ones producing America's teachers.

Your programs must foster an understanding in prospective teachers that they are users and also creators of knowledge about teaching. We will not truly develop teaching as a profession unless

they understand the existence of the knowledge base for teaching and how to use and contribute to that base. And unless they know this, we will not provide the foundation for improving student learning.

The "bag of tricks" -- the quick answers -- won't support the kind of student learning demanded by the national goals.

Your organization has already made a giant leap forward in support of this challenge, with its impressive publication, Knowledge Base for the Beginning Teacher.

Another step forward was the new NCATE standard on "Knowledge Bases for Professional Education." That requires that programs be based on essential knowledge and established and current research findings . . . that each professional studies course be built upon defensible knowledge bases . . . and that knowledge about inquiry and research be included in the program.

I believe this is a critical standard for prospective teachers' learning. They must know about research and its role in their professional lives. They must understand that they need to continue to learn to teach, and continue to learn about the subjects they teach and about the resources that will enhance their work. It is this combination that will mark them as a professional.

One implication of this is that teacher candidates need to learn how to learn to teach. And that a major part of this is learning the value of inquiry, the value of research knowledge.

At our December conference, Vanderbilt Professor Willis Hawley said something about teacher education that struck a chord with me. He said: "The basic purpose of preservice teacher preparation should be changed from the development of teaching competence to the development of the capabilities and motivation to learn to teach."

This would be a fundamental change in the way prospective teachers' learning takes place.

From my perspective at OERI, I would ask several questions in rearranging the curriculum for future teachers. These include:

Do prospective teachers know how to use ERIC, the world's largest education database? Do they know ERIC can not only provide access to current research but also to a multitude of documents on teaching practices? Do they know that we have research centers working on critical education problems? And regional labs that provide technical assistance to schools and teachers?

Do they know about research in specific areas important to their work? And do they understand that they must stay abreast of research developments for a very basic purpose: to improve their

students' learning?

I wish I could answer yes to these questions. But I have neither seen nor heard of any evidence that most prospective teachers learn such things.

In fact, a study completed this past year in Louisiana suggests quite the opposite. There, 6,000 randomly selected teachers were assessed over six class periods by three independent observers. The majority of beginning teachers were rated as unacceptable in teaching students to think and in using methods that actively involve students in opportunities to develop concepts.

For example, 83 percent of these teachers were found unacceptable in encouraging students to do critical analysis and problem solving. Similarly 84 percent were rated unacceptable in encouraging students to critique their own responses or those of other students. Of course you should know that the worse news is that experienced teachers received equally poor ratings.

This state of affairs in which thinking, inquiry and research are not valued must change if teaching is to be a profession.

Comparisons to the medical profession may seem overdone in our debates about teaching reform. But I think it's appropriate to

consider again the analogy. One goal of medical education is creating the habit of lifelong scholarship. Medical students become familiar with biomedical databases and they learn how to do research on problems.

In addition, medical schools have departments of continuing education that work with hospitals to upgrade the knowledge and competence of hospital staff. Similarly, law schools convince their students that learning will continue after graduation.

Why should the teaching profession not have similar expectations for its members?

We must have such expectations for our teachers, and for tomorrow's teachers, if our students are going to be successful. If we expect our students to be competent thinkers and lifelong learners, we can expect no less from our teachers.

This is your challenge. You are preparing the next generation of teachers. There is no more effective way to change the face of teaching in this country than through its new generation.

You hold the major responsibility for giving teachers what they need to know and be able to do as lifelong students of teaching and learning.

If you are not committed to developing inquiring minds in your teacher candidates, then much time will be lost, and many more of our school children will be lost.

I'd like to end with an anecdote about a middle school math teacher from Annapolis, Maryland. Her name is Joy Donlin, and she's been teaching for nearly 20 years. Many of her students are underprivileged and undermotivated.

Joy attended a meeting we held last fall of teachers from around the country to talk about research and information about teaching. She learned about new teaching strategies that come out of education research. She learned about new databases and electronic networks of teachers.

At the end, she talked about the need to keep her "toolbox" equipped with proven strategies that she can use to deal with the reality of life in her classroom. She was grateful for what she learned but frustrated that she hadn't learned earlier. She also wondered what other tools exist out there that she still doesn't know about.

Joy Donlin presents us with a challenge. For her to succeed at improving the learning of her students, she needs a toolbox that is well equipped. And she must know where and how to replenish those tools when she needs more.

The challenge to me is to make sure that the education research base continues to develop those new tools. The challenge to you is to make sure teachers know where to get these tools and, most importantly, how to learn to use them.

The learning of America's children -- and therefore the well-being of this country---depends on your meeting this challenge.

Thank you.